

6. (AMENDED) A process as claimed in claim [1] 2, wherein the source of [precipitating agent may be ammonium salt such as] chromium is selected from the group consisting of ammonium dichromate [or] and ammonium chromate [, preferably ammonium dichromate].

In each of claims 3, 4 and 5 in line 1, change "claim 1" to read --claim 2--

REMARKS

The abstract and claims have been amended as suggested by the Examiner and to meet the 35 USC 112 rejection. An amendment has been made on page 4 to correspond with that made to claim 6.

Turning now to the obviousness rejection under 35 USC 103 Kawai is directed to an oxidation process for producing alicyclic diketones from the corresponding diols. It uses what it refers to as "a specific kind of catalyst" - this being either a "copper type catalyst" or a Raney type catalyst. Only the copper type catalysts are of any conceivable relevance to the present application. Such catalysts are stated at column 4 to be of various types containing one of the following mixtures:

- 1) copper and zinc and/or chromium;
- 2) copper oxide and zinc oxide and/or chromium oxide;
- 3) copper and zinc and/or chromium and at least one of molybdenum, tungsten, magnesium, barium, aluminium, calcium, zirconium, cobalt manganese, nickel or the like;
- 4) the oxide equivalent of 3.

Several of these catalysts are clearly known being referred to as Adkins catalysts.

The catalysts of the present invention require the presence of four metals, copper, chromium, aluminium and zinc in specific proportions and having a specific x-ray diffraction pattern. The only four component catalysts mentioned by Kawai are:

- 1) zinc oxide - chromium oxide - copper oxide - magnesium oxide
- 2) zinc oxide - chromium oxide - copper oxide - barium oxide and
- 3) copper oxide - chromium oxide - barium oxide - manganese oxide.

There is no reason why one skilled in the art would think that aluminium oxide would be an appropriate replacement for magnesium or barium oxides in the first two of these or why zinc and aluminium oxide would be appropriate replacement for barium and manganese oxides in the third of these. There is little chemical similarity between the metals specified by Kawai and those required by the present invention. Furthermore Kawai's catalysts are for an oxidation process. The catalysts of the present invention are for a hydrogenation (that is a reduction) process.

The Examples of the present application show the importance of the use of the four metals specified in the claims as is shown by the following table:

| EXAMPLE | CATALYST COMPONENTS | SELECTIVITY FOR THF |
|---------|---------------------|---------------------|
| 1 | Cu, Al, Zn, Cr | 90% |
| 2 | Cu, Al, Cr | < 30% |
| 3 | Cu, Zn, Cr | < 25% |
| 4 | Cu, Cr | < 20% |
| 5 | Cu, Cr, Bn, Zn, Al | < 25% |
| 6 | Cu, Cr, Ba, Zn, Al | < 54% |

Furthermore as noted on page 10 of the specification, the catalysts of the present invention show prolonged activity (at least 630 hours).

Nothing in the prior art points toward the use of the specific four compound catalysts having defined molar composition and x-ray diffraction pattern which results in a catalyst having the advantageous properties noted above.

The Kawai catalyst must have copper and at least zinc OR chromium. In the present invention, the catalyst must have both - and in addition also aluminium. Kawai patent does not disclose the specific proportions of the components of the catalyst.

Furthermore as noted above the present catalyst is a hydrogenation catalyst whereas Kawai is dehydrogenation or oxidation catalyst. Teachings in respect of a catalyst employed for dehydrogenation of an alicyclic diol is hardly likely to predict a catalyst used for hydrogenation of a diethyl maleate.

Besides, the dehydrogenation process of Kawai et al is carried out in a liquid phase while, the catalyst of the present invention is employed in a hydrogenation process, which is carried out in a vapour phase.

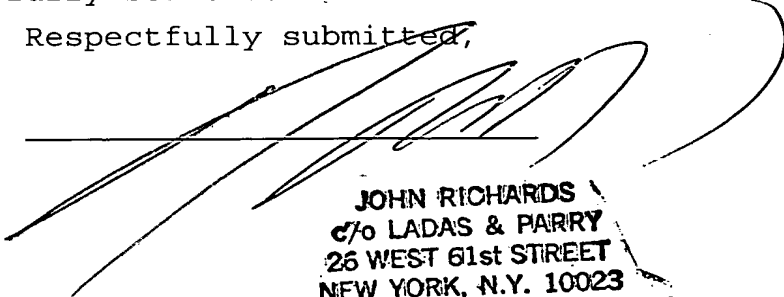
Clearly therefore nothing in Kawai points to the catalyst as claimed in the present invention or to its manner of production.

Similarly Rashkin fails to point the way to the present invention. Although Rashkin's catalyst is for hydrogenation reaction, it differs from that claimed in the present application. Rashkin's catalyst requires the presence of barium and does not include aluminium as required by the present invention. As noted above the example of the present invention show the importance of the presence of aluminium and the absence of barium. Good results are not obtained if the former is missing or if the latter is present, even if aluminium is also present.

Nothing in Kawai or Rashkin would lead one to believe that any benefit would follow from replacing Rashkin's barium by the aluminium required by the present invention. Rashkin catalyst consists of (a) 30-55 wt%CuO, 30-57 wt%Cr₂O₃, and up to 16 wt%ZnO. The catalyst is a barium-copper chromite catalyst, which has been impregnated with zinc. The composition of the catalyst of the present invention is different, so is its mannner of preparation. We are advised that the Rashkin catalyst will not work in the process of the present invention leave along exhibit 99% selectivity. In fact, even in the process envisaged by the Rashkin patent, the selectivity of the desired product is only 4.3 wt%.

In view of the foregoing it is believed that this application is in order for allowance and an early action to this end is respectfully solicited.

Respectfully submitted,



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